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ABSTRACT

This paper considers the needs of future educational systems in an age of information. Characteristics of such systems are described and analyzed. An information age educational system would stress the big picture, be experimental, emphasize skills and tools of thought and action and extend throughout life. It would have alternative delivery systems utilizing cable, microwave, satellites, and low power TV. It would enhance school curricula in rural areas by using interaction video-telecommunications. It would develop distance learning systems involving in the same class or the same course such diverse groups as high school students, factory workers, prison inmates, and the general public. Any and all information technologies would be used as creatively as possible to change the way people teach and learn. (JC)

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AMERICAN EDUCATION:

IMPLICATIONS FROM THE INFORMATION AGE

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For some time, we have been aware that the information age is far more than an academic abstraction, more than a single "high status" educational metaphor. Recent studies have demonstrated conclusively that the information age is, in fact, an economic reality. Information has always been an important economic tool, but now it has become the key element in developed countries. More than half of the U.S. GNP, for example, is earned in and well over half of its total work force engaged in the production of information. Almost 90% of new jobs created in the U.S. economy during the 1970's were in information, knowledge, or service jobs. Clearly, we have become a nation of information workers.

This information age also changes the way in which we view resources. It used to be that the location of the world's resources was of central importance and that resources were divided into those which could be renewed and those which could not. We now realize that information is also a resource, and a most unusual one at that, primarily because it cannot be used up.

Other resources are affected by the mechanical processes in thermodynamics; they need repair and ultimately wear out. But information does not. Instead, it expands with use. We frequently talk about an "exchange" of information even though it is basically inaccurate to do so. If you have information and manage to give it to me, you will, of course, still have it and so will I. We have not exchanged it as much as we have shared in its expansion.

So, the information age is real. But what are its effects on our lives?

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In a book to be published this fall,* Harlan Cleveland discusses several of the phenomena of modern times which flow from the nature of the "information age". He argues that fundamental changes are taking place in that the old "hierarchies" (ways of thinking and perceiving) have been disintegrating under the impact of the new age.

One of these -- the geopolitical view of the world -- has particular relevance for our topic today. In an especially insightful chapter, Cleveland discusses the "passing of remoteness". In bygone times, he claims, the world was dominated by the notion of location, the "idea that location is a form of power, that the political importance of communities is due to their geography". Communication satellites and fast computers have gradually erased distance, "eroding the idea that some places are world centers because they are near other places, while other areas are bound to be peripheral because they are remote from the 'center of things'." But "peripheral" now has a new meaning. Cleveland quotes the poet Octavio Paz, who said, "We Mexicans have always lived on the periphery of history. Now the center or nucleus of world society has disintegrated and everyone -- including the European and the North American is a peripheral being. We are living on the margin . . . because there is no longer any center . . . world history has become everyone's task and our own labyrinth is the labyrinth of all mankind".

One consequence of this loss of remoteness is that civilizations will be built more around communities of people than around communities of place. Anthropologists have held for some time that cultures need not be contiguous but can be networks of people who share roles or economic status. Thus, there is a community of shared meanings and values which involve teaching as an

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*Excerpts in this paper are from The Knowledge Executive: Leadership in an Information Society to be published in Fall, 1985 by E. P. Dutton.

occupation; one of the reasons teachers can communicate with one another easily across national or language barriers is that they are members of the same sub-culture. Likewise, there is a "culture of affluence" throughout the world, and, in stark contrast, a "culture of poverty" also; members of each group share meanings and values.

Cleveland's notion of communities of people extends and reshapes this anthropological idea. Thus, more and more, the term "nation" means "ethnicity", not location. Witness, says Cleveland, ". . . the Frenchness of Quebec, the tribal loyalties of the Ibo in Biafra, the separation of the Scots, the rhetorical nationhood of the Arabs, the world's many diasporas from the Overseas Chinese to the Zionist and non-Zionist Jews outside Israel." Such "extra-national" identifications will tend to increase, powered by the ease of networking through the linking of microcomputing and telecommunications on a global scale.

The changes wrought by the information age have had considerable impact on society. They should also have deeply affected the ways in which we teach and learn in our schools. But, in truth, has teaching and learning been consciously altered in response to the demands of this new age?

To answer this question, it is necessary first to ask what a response should look like. How would we design an educational system to prepare people for life in an information age?

At the risk of gross oversimplification, I would identify five characteristics which should be possessed by such a system: It should have a global perspective, an experimental ethic, an emphasis on critical thought, a "tool" orientation and a cradle to grave scope.

1. The brave new information age into which we have moved places a high premium on the ability to see the biggest of all possible pictures. The increasing tendency to organize communities by ethnicity rather than location means an ever more fluid, non-rigid world. Our perceived need to focus on the "nation" as the central theme in the school curriculum has literally been swept away by the tide of events we call the information age. The broadest possible view -- a global perspective -- must certainly be a feature of the new educational system. This global view should permeate the teaching of all school subjects. Global concerns and issues have succeeded in penetrating school curricula, but all too often through social studies courses alone. Even here, in the social studies, a global perspective is usually expressed as an "addition" to the basic curricula, not as a central, critically important feature. This does not mean a wholesale substitution for existing content but a change in viewpoint. It means using examples from foreign currency to teach arithmetic functions, it means emphasizing the "cross-cutting" global issues (e.g., ecology, food production, hunger, population control, and so on) when teaching biology; and it means doing thought problems in mathematics related to situations in the Soviet Union, Israel, or Kenya. It means consciously structuring cross-cultural contacts and experiences for all students. It means an unrelenting and pervasive emphasis upon language learning. Always, a global perspective adopts and encourages the wider as opposed to more narrow world views.

2. Long ago, Harold Benjamin taught us that school curricula had an amazing ability to hang on even though outdated. In his whimsical book, Saber-Tooth Curriculum, Benjamin describes a course of study designed in a time of saber-tooth tigers which persists long after the tigers have become extinct.

In my terms, Benjamin's basic argument is that the school curriculum should be subject to an experimental ethic. The stubborn resistance by schools to the adoption of a full global perspective is due to the fact that the saber-tooth curriculum still exists. The information age, though, needs new metaphors, new content, new organizers. It demands that we stop thinking about the saber-tooth tigers and deal with new realities.

The design for a new educational system should seek to teach about the whole world. It should analyze the nature of that world and seek to organize instruction in new ways so as to teach people to understand the world better.

Such a system would experiment with organizers like those proposed by David Saxon, Chairman of the MIT Corporation. Saxon suggested that education look to the nature of society for its content; since societies in the world are technological, xenophobic, and nuclear in character, Saxon argues that education should be organized around those descriptors. The technological character of the world mandates that everyone learn something about the nature and limits of science. The world's endemic xenophobia means the ever present danger of conflict caused by irrational hatred and suspicion and calls for education to emphasize the diminishment of same. And the nuclear capability of the world makes it urgent for us to address the other two.

Saxon's formulation is particularly incisive, but there are others which could be used as organizers as well. Radicals like Paolo Friere enunciate "liberation" or "emancipation" as educational themes. Others seek to use computers as a way of "deschooling" the education process. Still other politically oriented educators attempt to offset the presumably apolitical and aeconomic orientation of the schools and emphasize the "hidden" aspects of school curricula.

The point is not that Saxon's or any other formulation should be accepted but that new ways of organizing be tried, that an experimental ethic prevail.

3. As noted earlier, information expands with use. This tends to create a lot of it. Information comes to all of us like the old Nile at flood stage, threatening to inundate all in its path. In rawest form, it is unorganized and uncontrolled; unless it is converted into knowledge, it works to our detriment rather than our benefit.

To deal successfully with this ever-expanding information flow, people need the ability to process and interpret large amounts of information, to use it to their benefit. Therefore, a core element in a new educational system needs to be the development of the ability to make knowledge out of information. This means that we must place a solid emphasis upon the skills of critical thought.

Teachers have long been seeking ways to have their students learn to think critically. But the goal would assume a heightened status in a new educational system for the simple reason that it is the clearest and most relevant source of power in an information. Great premium will be placed upon a person's ability to help select and analyze information, rather than merely supply it.

The development of critical thought is a key goal in each of the subject fields. In a redesigned educational system, the emphasis must be upon those aspects of the discipline which allow creative interpretation and generalization, rather than upon the low level facts produced in abundance as information in each subject area.

4. One of the standard uses of formal education has always been to provide young people with at least the tools needed for survival in a society, so schools have always been "tool-oriented" to some degree. Such an

orientation is even more important in an age when we envision a high-tech future. Most observers agree that the native work will be changed substantially by the information age, although they disagree on the kind and direction of the change. Whether, as some predict, most workers will be deskilled by new technologies and absorbed into service industries remains to be seen. Whichever way it goes, every young person needs to know how to use the basic technologies of the information age.

The combination of microcomputing and television unleashes enormously promising possibilities for education. Education could become less place-bound; schools would have the potential for moving the locus of instruction from the self-contained classroom to wherever computers or television sets exist. The pervasive problem that schools have in providing direct, hands-on experience is to a degree, at least, resolved because technology now allows students to interact with people and events anywhere in the world.

What does this mean for learning to use "tools"? Clearly, children and adolescents need to know the mechanics of computer and interactive video use. But this kind of literacy will not be achieved without attention to more traditional forms -- reading and writing. A new educational system would provide for both -- a broadened view of what "tools" are needed and an emphasis on the uses of both new and old technologies.

5. For years we have talked about the need for "life-long" or "cradle to grave" structures for education. Clearly, the information age sets the stage for implementing a new structure. A relevant system of education would provide for an expansion of educational opportunities; it would have us practicing what we've preached about life-long education. The notion of a "terminal" certificate or degree is now outmoded, as people change careers, combine jobs and school, and generally seek to stay abreast of the big

dramatic changes in society. A new design for education, however, would reduce the idiosyncracy that currently exists and move instead toward a more planful arrangement wherein "entitlements" for each person are available, perhaps in the form of vouchers useful throughout life as tuition payments for instruction received.

An information age educational system, then, would stress the big picture, be experimental, emphasize skills and tools of thought and action, and extend throughout life. It would have alternative delivery systems utilizing cable, microwave, satellites, and low power TV. It would enhance school curricula in rural areas by using interactive video-telecommunications. It would develop distance learning systems involving in the same class or the same course such diverse groups as high school students, factory workers, prison inmates, and the general public. It would, in short, use any and all of the information technologies as creatively as possible to change the way we teach and learn.

Back to Harlan Cleveland's idea for just a moment. Americans, he says, are currently the least remote people in the world. Because they are able to compute and communicate, they are, in his terms, "pervasively engaged" with other societies. We have been, then, more deeply impacted by the information age than other societies. Because of this, one could expect that U.S. schools might have adjusted more readily to the times and have moved in the directions outlined earlier. But have they? Have U.S. schools adopted a global perspective? Do they emphasize skills of critical thought and the tools of information technology? Are they alert to people's needs to acquire new skills or for periodic relearning?

Our schools are currently in the throes of yet another of the "reform movements" which have become an expected periodic feature of our educational environment. Over the past two years, at least 50 major reports have been issued containing several thousand recommendations for the improvement of schools. Like all such movements, its causes are difficult to uncover for sure, and it is very diverse in scope. But, certainly one major element driving this reform movement is the belief that academic standards are too low, and the most frequent recommendation is that we should raise our sights and do better. Since the information age demands that people know more, one could argue that recommendations flowing from this movement are consistent with emerging needs, at least in some respects. Further, the reports generally advocate that schools address the problem of teaching foreign languages and that requirements be increased in that area. This, too, is consistent with new demands.

However, it is not safe to assume that our reform movement reflects the needs of an information society, that if we followed the consensus recommendations of the reports, the cause of good education would be advanced. In fact, there is much in the reports and in the movement which seems antithetical to the grand design noted earier.

Take, for example, the most influential of the reports on American education, the one entitled A Nation at Risk, issued by the National Commission on Excellence in Education. The report clearly enlists schools in the economic battle to keep America strong in international trade and, hence, stresses education's strategic importance. But, the report identifies the loss of our preeminent position in the world as the major "risk" we currently face! Hardly an illustration of heightened global awareness by a national leadership group.

Further, A Nation at Risk and other reports seem to recommend an increase in the rigidity of an already rigid system by advocating more standardization of curricula and, presumably, of teaching techniques. While the various reports are laced with cries for creative thinking and high level mental activity, they do not seem to advocate innovation and creativity in teaching. While the reports recommend more attention to computer education, they ignore substantial capital investments necessary to make optimum use of information technology.

So, the reform reports are only partially linked with the needs of education in an information age. But what of the schools themselves? Have they traveled further down an appropriate road? Or are they stuck in the same place as the reports?

As Americans are prone to say, the situation is mixed -- there are some good things and some bad things.

On the plus side is the global education movement in the U.S. Despite a very conservative political environment, global education is strong and seems to be gaining strength each year. Its major strength is in the social studies area with far less involvement by teachers from other curriculum areas. An especially notable aspect of global education in the United States is its grass roots quality; that is, literally thousands of primary and secondary teachers are involved in the movement, a factor which suggests that the movement will persist through force of numbers alone. On balance, substantial progress has been made in global education.

Schools in the U.S. have responded well, I think, to the technological needs of the information society. Admittedly, our schools are still notoriously undercapitalized and, hence, do not have sufficient numbers of computers. But better than most schools, they teach computer skills and use computers to teach various subject matters with fair regularity.

On the negative side, there are several areas in which our schools have not done much at all in response to the information age. The emphasis in our schools upon critical thinking has not been at all impressive. Schools will often adopt the goal of critical thought and teachers will frequently note the difficulties their students have in what is called high level thought. But study after study reveals that instruction in American schools is dominated by teacher talk and that all too often the prevalent kind of learning is rote memorization.

Foreign language instruction remains a major problem in U.S. schools. There is currently a strong advocacy for increasing both the quality and quantity of language teaching in our country, but adding to the stock of language teachers is very difficult to accomplish. Progress in this area will be slow.

Likewise, the accomplishments of American schools in terms of alternative delivery systems have been modest. There have been significant experiments in using interactive video, for example, but nothing exists in U.S. schools as comprehensive in scope as the open systems envisioned in the information age.

After all this, then, what can we say about education and the information age? If a "new" education is necessary to survival in such an age, shouldn't we be anxious over the state we are in, over the fact that our schools are not well equipped to teach in a new age?

Some observers are pessimistic to the point of nervous breakdowns, but I for one am not. Progress has indeed been slow and sporadic. We do need to keep in mind, though, how complex all of these issues are, how conservative our schools have been, and how slowly social change takes place under the best of circumstances. Schools do seem to be moving in desirable directions, and probably they are doing so as rapidly as both teachers and students see the need to do so. What we must do, it seems to me, is to continue the dialogue

started here, to keep trying to get a grip on the issues, and to get our minds around all of the complexity involved.